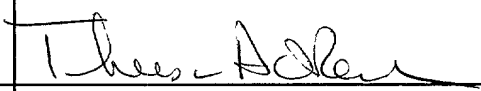
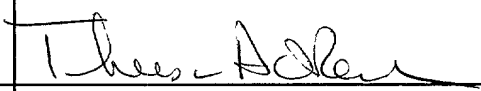
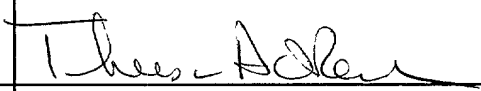


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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

0010/PTO Rev. 10/97  <b>NEW UTILITY PATENT APPLICATION TRANSMITTAL</b> <i>(to be used for new applications only)</i>	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket Number	SAL-3.2.001/7563-1
		First Named Inventor	Peter Salgo
		Total Pages in this Submission	61

**TITLE: Patient Weighing Apparatus**  
**INVENTOR(S) (List all): Peter Salgo**

APPLICATION ELEMENTS	ACCOMPANYING APPLICATION PARTS								
<p>Notice: Checklist items mentioned under Application Elements section construct a new utility patent application. Please refer to MPEP Sections 506, 601, (37 CFR 1.77, 1.53, 35 USC 111, 112, 113) for detailed explanation regarding completeness of an original patent application</p> <p>1. <input checked="" type="checkbox"/> Fee Transmittal Form (prescribed filing fee(s))</p> <p>2. Specification</p> <p><input checked="" type="checkbox"/> Abstract of the Disclosure</p> <p><input checked="" type="checkbox"/> Title of the Invention</p> <p><input type="checkbox"/> Cross References to Related Applications <i>(if applicable)</i></p> <p><input type="checkbox"/> Statement Regarding Federally-sponsored Research Development <i>(if applicable)</i></p> <p><input type="checkbox"/> Reference to Microfiche Appendix <i>(if applicable)</i></p> <p><input checked="" type="checkbox"/> Background of the Invention</p> <p><input checked="" type="checkbox"/> Brief Summary of the Invention</p> <p><input checked="" type="checkbox"/> Brief Description of the Drawings <i>(if drawings filed)</i></p> <p><input checked="" type="checkbox"/> Detailed Description</p> <p><input checked="" type="checkbox"/> Claim or Claims</p> <p>3. <input checked="" type="checkbox"/> Drawing(s) <i>(when necessary as prescribed by 35 USC 113)</i></p> <p>4. <input checked="" type="checkbox"/> Executed Declaration</p> <p>5. <input checked="" type="checkbox"/> Genetic Sequence Submission <i>(if applicable, all must be included)</i></p> <p><input type="checkbox"/> Paper Copy</p> <p><input type="checkbox"/> Computer Readable Copy</p> <p><input type="checkbox"/> Statement Verifying Identical Paper and Computer Readable Copy</p>	<p>6. <input type="checkbox"/> Assignment Papers</p> <p>7. <input type="checkbox"/> Certified Copy of Priority Document(s) <i>(if foreign priority is claimed)</i></p> <p>8. <input type="checkbox"/> Computer Program in Microfiche</p> <p>9. <input type="checkbox"/> English Translation Document <i>(if applicable)</i></p> <p>10. <input checked="" type="checkbox"/> Information Disclosure Statement/PTO-1449 <input checked="" type="checkbox"/> Copies of IDS Citations</p> <p>11. <input type="checkbox"/> Petition Checklist and Accompanying Petition</p> <p>12. <input type="checkbox"/> Preliminary Amendment</p> <p>13. <input type="checkbox"/> Proprietary Information</p> <p>14. <input type="checkbox"/> Return Receipt Postcard</p> <p>15. <input checked="" type="checkbox"/> Small Entity Statement</p> <p>16. <input type="checkbox"/> Additional Enclosures <i>(please identify below):</i></p> <table border="1"><tr><td colspan="2"></td></tr></table> <p><b>SIGNATURE OF APPLICANT, ATTORNEY OR AGENT</b></p> <table border="1"><tr><td>Firm or Individual Name</td><td>Friedman &amp; Siegelbaum, LLP 399 Park Avenue, 20th Floor New York, New York 10022</td></tr><tr><td>Signature</td><td></td></tr><tr><td>Date</td><td>March 3, 1999</td></tr></table>			Firm or Individual Name	Friedman & Siegelbaum, LLP 399 Park Avenue, 20th Floor New York, New York 10022	Signature		Date	March 3, 1999
Firm or Individual Name	Friedman & Siegelbaum, LLP 399 Park Avenue, 20th Floor New York, New York 10022								
Signature									
Date	March 3, 1999								

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Application Number		Class		Independent Claims	
Date of Receipt	Application Type		GAU	Total Claims	
	Filing Date		Foreign Filing License?	Drawing Sheets	
	Small Entity		Foreign Address?	Special Handling?	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: (check one) ☒ Application of: Peter Salgo  
(Inventor Names)  
☐ Patent of:  
  
☒ Serial No.: Unassigned ☐ Patent No.: Unassigned  
  
☒ Filed.: March 3, 1999 ☐ Issued: \_\_\_\_\_  
Filing Date or Herewith Date of Issuance  
  
Examiner: Unassigned Group Art Unit: Unassigned

For: PATIENT WEIGHING APPARATUS  
Title of Application

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS**  
**[37 CFR 1.9(f) and 1.27(b)] - Independent Inventor**

Honorable Commissioner of Patents and Trademarks  
Washington, D.C. 20231

Sir:

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled PATIENT WEIGHING APPARATUS described in:  
(Title of Application)

☒ the specification filed herewith

☒ application serial no. To Be Assigned, filed herewith

☐ patent no. \_\_\_\_\_, filed \_\_\_\_\_

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

(check one)

- ☒ no such person, concern, or organization  
☐ persons, concerns or organizations listed below\*

Full Name:  
Address:

☐ INDIVIDUAL ORGANIZATION      ☐ SMALL BUSINESS CONCERN      ☐ NONPROFIT

.....  
Full Name:  
Address:

☐ INDIVIDUAL ORGANIZATION      ☐ SMALL BUSINESS CONCERN      ☐ NONPROFIT

.....  
Full Name:  
Address:

☐ INDIVIDUAL ORGANIZATION      ☐ SMALL BUSINESS CONCERN      ☐ NONPROFIT

.....  
I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. [37 CFR 1.28(b)]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true' and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application, any patent issuing thereon, or any patent to which this verified statement is directed.

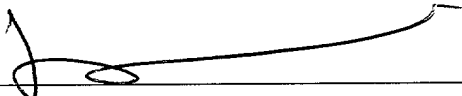
\_\_\_\_\_  
**\*NOTE:** Separate verified statements are required from each named person, concern, or organization having rights to the invention averring to their status as small entities.

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Name of person signing: Peter Salgo  
Address of person signing: 200 West 60th Street, Apt. 33A  
New York, NY 10023

Signature: \_\_\_\_\_



Date: March 1, 1999

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## **PATIENT WEIGHING APPARATUS**

### **FIELD OF THE INVENTION**

This invention relates to weighing patients in a hospital bed and particularly to a new arrangement for weighing sick patients.

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### **BACKGROUND OF THE INVENTION**

There are many medical conditions which may be treated more effectively than they are today if the weight of a patient having such a condition could be easily and continuously monitored without the need to either get the patient out of bed or weigh the bed separately from the patient for weighing with the patient in combination at a later time.

The present weighing systems for bedridden patients in hospitals and/or long term care facilities include chairs and/or bulky slings coupled with scales in which a patient is moved from his/her bed for purposes of weighing. These systems are cumbersome and require a substantial amount of human intervention to operate. Many sick patients are too unstable to tolerate the amount of motion these systems require of them. Other present devices include a large scale upon which an empty bed is first weighed as a calibration followed by subsequent weighing of the patient/bed combination at a later time. A patient's weight is thus found by subtracting the initial bed weight from the combination total. Such a scale is expensive and thus represents a limited resource. These devices may not be suitable if a patient's stay in a facility extends over a prolonged period of time.

Some examples of conditions where the weight of a patient is a significant

indicator of the effectiveness of treatment include, but are not limited to, Congestive Heart Failure, Open Heart Surgery, Vascular Surgery, Sepsis and Extreme Diarrhea/Intestinal Upset. Said conditions often render a patient weak, debilitated and unable to stand without assistance, thus making it almost impossible to weigh him/her in the conventional manner (*i.e.*, standing up on a scale).

A treatment for Congestive Heart Failure includes the elimination of retained excess fluid wherein body weight is a clear indication of success or failure of said treatment. The same can be said of Open Heart Surgery, which is often characterized by Congestive Heart Failure, wherein additional fluid is added to the body during surgery.

Further, during Vascular Surgery, which may often be performed on Congestive Heart Failure patients, blood vessels leak resulting in excess body water which must be excreted by the kidneys. Sepsis, which is a condition wherein bacteria is found in the blood stream, also results in leakage of water from blood vessels into tissues necessitating treatment with additional fluid in order to maintain blood pressure. Lastly, the treatment of Extreme Diarrhea and Irritated Intestines often require massive amounts of fluid recucitation to treat dehydration. For each of these conditions the patient's body weight is a marker for clinical progress or lack thereof. Indeed, all of these conditions require monitoring of the patient's body weight in order to regulate the treatment for the condition. Therefore, a simple and easy way to consistently and continuously weigh a patient throughout his/her treatment is necessary.

Thus, there is a need for a system that can monitor the weight of a patient in a hospital bed without the need to move the patient. There is a further need for such a system to be inexpensive and easy to operate.

Systems have been suggested to monitor the presence or absence of patients in hospital beds automatically, but none for continuously monitoring their weight while in the bed, independent of the bed's weight itself. It has been suggested that a bed position and activity sensing apparatus could be constructed by using an elongated sensor for placement parallel to one axis of the bed. The sensor includes first and second conductive members where the first conductive member has a resistance per unit length substantially different from that of the second conductor member. One of the conductive members is electrically coupled to a source of electrical power wherein the weight of the body in the bed urges the first and second conductive members together to define an electrical path for output of a sensor signal which varies in magnitude responsive to the position of the body along the sensor.

Such a system is shown in U.S. Patent 5,353,012, which issued on October 4, 1994 to Barham *et al.* and is entitled "Bed Position and Activity Sensing Apparatus". Other patents relating to this subject matter are U.S. Patent 4, 844,488 which issued December 1, 1988 to Musick and is entitled "Bed Sensor and Alarm" and U.S. Patent 4,565,910 which issued January 21, 1986 to Mersick *et al.* and is entitled "Switch Apparatus Responsive to Distortion". These systems, while having an electrical device mounted in a patient's bed or adhered to a patient's sheet, are used for sensing the whereabouts of the patient and are not used for weighing the patient.

Devices exist similar to the switches of the above mentioned patents which are used as potentiometers. Such a device is disclosed in U.S. Patent 5,157,372 ("the '372 patent"), which issued October 20, 1992 to Langford and is entitled "Flexible Potentiometer". The '372 patent is hereby incorporated by reference as though fully set

forth herein. Such devices are manufactured and sold by Flexpoint of Midvale, Utah 84047 under the title of Flexible Sensor Systems. It is known that the degree of flexure of such a device will provide a measurable resistance indicative of the curvature thereof.

## **BRIEF DESCRIPTION OF THE INVENTION**

In the present invention, a flexible potentiometer is mounted on top of a bed or mattress having a known compliance, *i.e.* known degree of flexure for a given weight, and connected to an electrical system for detecting and measuring the resistance of the potentiometer, thus to indicate the weight of a patient. In one embodiment, the flexible potentiometer is adhered to a sheet of plastic, such as Mylar, and placed upon the bed like a protective sheet for the bed. In a further embodiment a plurality of flexible potentiometers are adhered to the sheet of plastic to enable weighting of the patient without regard to the position of the patient in the bed.

The output of the apparatus can be used for directly ascertaining a patient's weight and displaying/recording thus weight. The output may also be used to help control servo mechanisms in medication dispensing devices. For example, in infusion pumps the rate can be continuously adjusted as the patient's weight changes. Other such servo/feedback devices could be applied to other devices such as hemodialysis machines (artificial kidneys).

In another embodiment, the flexible potentiometer is connected to a medicine-dispensing machine wherein a signal indicative of the resistance of the potentiometer is fed back to the medicine-dispensing unit so as to continually adjust the rate at which such medicine is dispensed.



## **DESCRIPTION OF THE DRAWINGS**

FIGURE 1 is a drawing of a plastic sheet with six flexible potentiometers adhered thereto.

FIGURE 2 is a picture of a hospital bed with the plastic sheet of FIGURE 1 placed thereon wherein the potentiometers are connected to a medicine-dispensing machine.

FIGURE 3 is a circuit diagram of circuitry for monitoring the resistance of the potentiometers in FIGURE 2.

## **DETAILED DESCRIPTION OF THE INVENTION**

Referring now to Figure 1, we see a plastic sheet **10** that has six flexible potentiometers **11a-11g** adhered thereto. Each of the potentiometers is preferably a potentiometer as shown and described in U.S. Patent No. 5,157,372 incorporated herein aforesaid. Each of the potentiometers **11a-11f** has a pair of leads **12a-12f** and **13a-13f** respectively, connecting the potentiometer to a connector **14** at the edge of the plastic sheet **10**. The conductors **12a-12f** and **13a-13f** may be printed conductors also adhered to the plastic sheet **10**. The connector **14** is connected by a ribbon conductor cable **15** to connector **16** which is used to electrically connect each of the potentiometers **11a-11f** to monitoring circuitry shown in FIGURES 2 and 3.

Referring now to FIGURE 2 we see a hospital bed **17** having the sheet **10** placed thereon with the potentiometers **11a-11f** attached to said sheet. The conductor **15** connects the potentiometers **11a-11f** on the sheet **10** to a monitoring unit **18** that is hanging on a pole **16** next to the bed **17**. Said monitoring unit **18** may be stand-alone or be part of larger patient monitoring system integrated therein, such as but not limited to

that sold by Hewlett Packard Company. A second ribbon conductor cable **19** connects an output signal from the monitoring unit or system **18** to an existing medicine-dispensing device **21**, such as but not limited to those currently made and sold by the Ivac Corporation, Baxter Company, Marquette Company and the Alaris Company. The bed **17** has a mattress **22** supported by the bed **17** which has a known degree of flexure for each particular weight of a patient, i.e. a known compliance. If the compliance is not known, it can be measured with a known weight so as to be calibrated to the known compliance.

Referring now to FIGURE 3 we see the details of the monitoring unit **18**. The monitoring unit **18** has a microprocessor **23** therein that is connected to the conductors **12a-12f** and **13a-13f** by the ribbon conductor cable **15**. The microprocessor **23** is also connected to a read only memory (ROM) **24**, or any other non-volatile memory, which stores therein the information relating to the resistance versus flexure characteristics of the potentiometers **11a-11f** and the mattress **22** of the bed **17**.

The microprocessor **23** is also connected to a random access memory (RAM) **26**. The microprocessor **23** together with the RAM **26** and ROM **24** calculate the weight of the patient in the bed **17**. When the multiple potentiometers **11a-11f** are used the monitoring unit **18** compares the values of each of the potentiometers to determine the position of the patient in the bed **17** and calculates the patient's weight, using a select one or more of the potentiometers **11a-11f**, in accordance with such additional information. The result of the calculation is displayed on a LED display **27**. The result is also provided to the medicine-dispensing device **21** by the ribbon cable **19** to control the rate at which the medicine is dispensed.

While this invention has been described with respect to a particular embodiment thereof, those of ordinary skill in the art can make various modifications thereof without departing from the spirit or scope thereof.

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## ABSTRACT

An apparatus for weighing a patient while the patient remains in bed including at least one flexible potentiometer mounted on top of a bed or mattress having a known compliance, *i.e.* known degree of flexure for a given weight, and connected to an electrical system for detecting and measuring the resistance of the potentiometer, so as to indicate the weight of the patient. The flexible potentiometer may also be adhered to a sheet of plastic, such as Mylar, and placed upon the bed like a protective sheet for the bed. The apparatus may include a multiple of flexible potentiometers. Further, the device to which the flexible potentiometer is connected may be used to help control servo mechanisms in medication dispensing devices such as infusion pumps and/or hemodialysis machines (artificial kidneys).

What is claimed is:

1. A system for weighing a patient in a bed, said system including:  
a bed having a mattress with a known degree of flexure for given weights;  
a flexible potentiometer mounted on top of said bed having a resistance based on  
5 a degree of flexure thereof; and  
an electrical monitoring system for monitoring the resistance of the potentiometer  
to indicate the weight of said patient.
2. The system for weighing a patient in a bed as described in claim 1 also including:  
a sheet of material; and  
10 wherein said flexible potentiometer is adhered to said sheet of material.
3. The system for weighing a patient in a bed as described in claim 2 also including:  
a second flexible potentiometer adhered to said sheet of material to enable  
weighing said patient without regard to the position of said patient in said bed.
4. The system for weighing a patient in a bed as described in claim 1 also including:  
15 circuitry connected to a separate device for providing a signal indicative of the  
resistance of the potentiometer device.
5. The system for weighing a patient in a bed as described in claim 4 when said  
separate device is a medicine-dispensing machine.
6. The system for weighing a patient in a bed as described in claim 4 when said  
20 separate device is a dialysis machine.
7. The system for weighing a patient in a bed as described in claim 4 when said  
separate device is an intravenous fluid-dispensing machine.
8. The system for weighing a patient in a bed as described in claim 1 when said

signal is used in the calculation of parameters critical to a patient's care.

9. The system for weighing a patient in a bed as described in claim 4 also including:  
a sheet of material; and

wherein said flexible potentiometer is adhered to said sheet of material.

- 5 10. The system for weighing a patient in a bed as described in claim 5 also including:  
a second flexible potentiometer adhered to said sheet of material to enable  
weighing said patient without regard to the position of said patient in said bed.
11. The system for weighting a patient in a bed as described in claim 2 in which said  
material is a plastic.

A hand-drawn schematic diagram of a device, labeled 10, which consists of a rectangular frame divided into six vertical chambers. The chambers are arranged in two columns of three. The left column chambers are labeled 12a, 12b, and 12c from bottom to top. The right column chambers are labeled 12f, 12e, and 12d from bottom to top. Each chamber contains a vertical, elongated, rounded rectangular component. In the left column, these components are labeled 11a, 11b, and 11c from bottom to top, with arrows pointing to them from the left. In the right column, they are labeled 11f, 11e, and 11d from bottom to top, with arrows pointing to them from the right. The top of each chamber is defined by a horizontal line, labeled 13a, 13b, 13c on the left and 13f, 13e, 13d on the right. A horizontal bar, labeled 14, is positioned at the bottom of the frame, spanning the width of the chambers. Below this bar, a vertical line, labeled 15, extends downwards. At the very bottom, a rectangular block, labeled 16, is connected to the vertical line 15.

Figure 1

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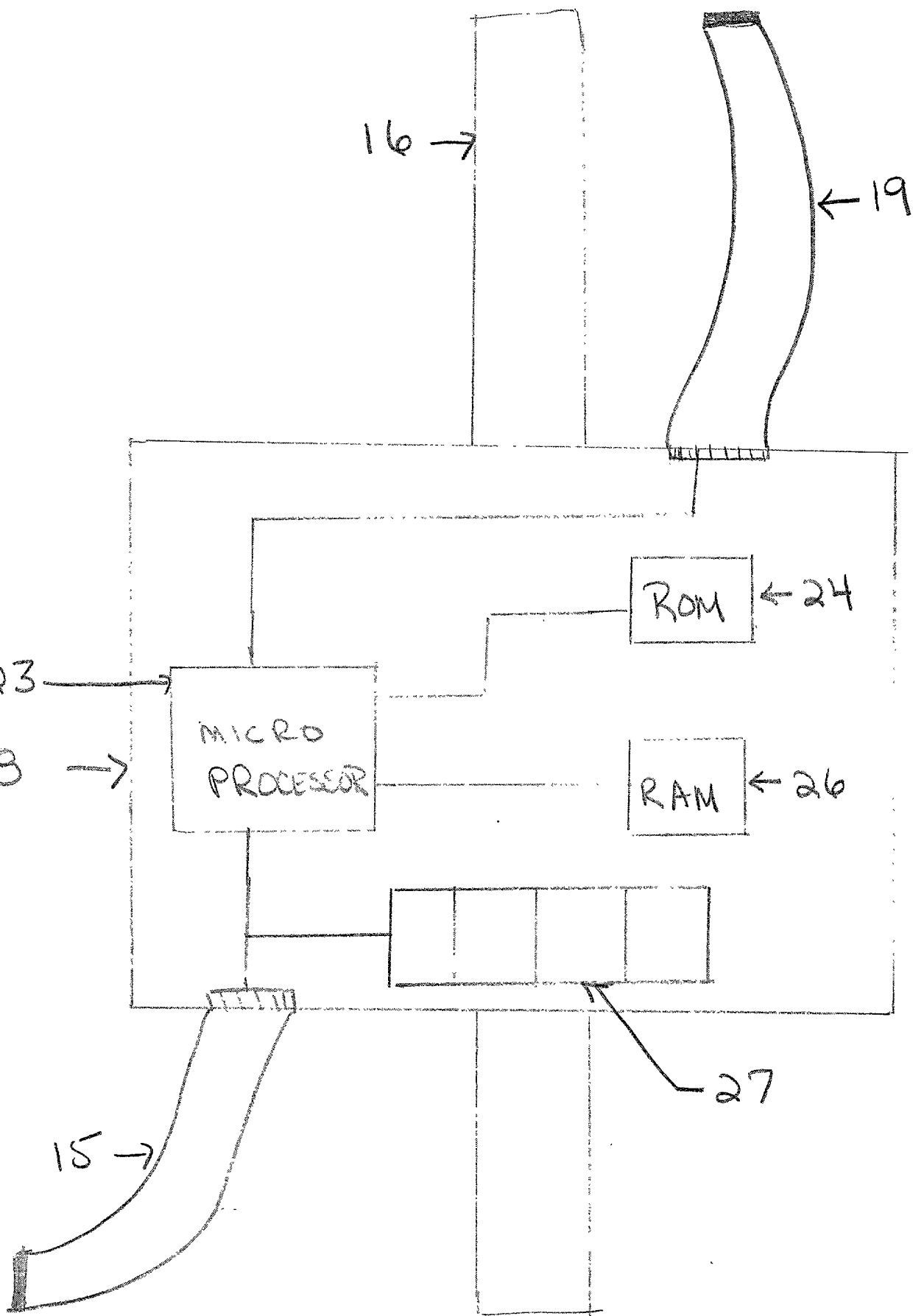


Figure 3

# DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled PATIENT WEIGHING APPARATUS, the specification of which is attached hereto unless the following is checked:

\_\_\_ was filed on \_\_\_ as United States Application Number or PCT International Application Number \_\_\_ and was amended on \_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):

Priority Claimed

_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	___ Yes ___ No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	___ Yes ___ No

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

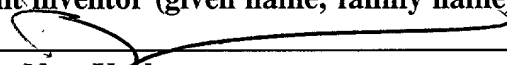
_____ (Application Number)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)
_____ (Application Number)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Richard J. Samuel, Reg. No. 24,435, Theresa A. O'Rourke, Reg. No. 40,747, Shahan Islam, Reg. No. 32,507, Stanley I. Rosen, Reg. No. 19,441, Nicholas J. DuBois, Reg. No. P-41,719

Address all correspondence to: FRIEDMAN □ SIEGELBAUM, LLP  
399 Park Avenue  
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(212) 339-5923

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first joint inventor (given name, family name) Peter Salgo  
 Inventor's signature  Date: March 1, 1999  
 Residence: New York, New York Citizenship: U.S.A.  
 Post Office Address: 200 West 60th Street, Apt. 33A, New York, New York 10023

Full name of second joint inventor (given name, family name) \_\_\_\_\_  
 Inventor's signature \_\_\_\_\_ Date: \_\_\_\_\_  
 Residence: \_\_\_\_\_ Citizenship: \_\_\_\_\_  
 Post Office Address: \_\_\_\_\_

\_\_\_ Additional inventors are being named on separately numbered sheets attached hereto.

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